

VACUUM CLEANER

TECHNICAL FIELD

The present invention relates to a vacuum cleaner which can remove substances from the bottom by a rotary force of a brush and a vacuum pressure operated on a suction head by rotatably installing the brush on the suction head, and more particularly to, a vacuum cleaner which can consult a user's convenience by preferentially sucking thin and long substances such as hairs or furs of a pet dog not to be wound around the brush.

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BACKGROUND ART

In general, a vacuum cleaner generates a suction force by a vacuum pressure, sucks the air and substances from the bottom, separates the air from the sucked substances, filters fine alien substances of the sucked air through various filters, and discharges the air.

The vacuum cleaners are classified into a cylindrical floor type vacuum cleaner, an upright type vacuum cleaner and a hand type vacuum cleaner by uses and using methods. The floor type vacuum cleaner can efficiently clean a hard bottom such as a wooden floor generally in a house, the upright type vacuum cleaner can efficiently clean a carpet, and the hand type vacuum cleaner can efficiently clean a narrow space such as stairs and desks.

The floor type or upright type vacuum cleaner includes a main body for generating a suction force, separating substances on a suction path, and filtering off fine alien substances of the sucked air such as dusts, and a suction head or a suction nozzle unit linked to the main body, for contacting the bottom and sucking the substances and the ambient air.

In detail, the main body houses a suction motor for generating a suction force in a main body casing in which a suction path for the sucked air has been formed, and includes a filter assembly disposed higher than the suction motor in the sucked air flow direction, for filtering off fine alien substances of the suction flow

5 such as dusts.

Here, a suction tube linked to the suction head is connected to the lower region of the main body casing, and an exhaust unit having a plurality of holes for discharging the air passing through the suction motor and the filter assembly is formed at the rear upper region of the main body casing.

10 As shown in Fig. 1, the suction head is installed at the lower portion of the main body casing to be linked to the main body casing. A suction casing 2 having a suction hole 2h on its rectangular bottom surface for the inflow of the sucked air is installed to be linked to the suction tube 1 of the main body casing. A brush 4 adhered to an agitator is rotated on the suction hole 2h of the suction casing 2, for

15 pressurizing and agitating the inside of the carpet by the rotary force, floating dusts hidden deep in the carpet, and sucking the substances from the bottom by a suction force by a vacuum pressure generated in the main body. If necessary, a plurality of bristles can be protruded from the brush 4 to easily clean the carpet.

The structure of Fig. 1 is one example of the upright vacuum cleaner. However,

20 the floor type vacuum cleaner can have the same structure. That is, the agitator and the brush can be installed on the suction head, for pressurizing the bottom to facilitate suction of substances from the bottom.

Here, the brush 4 is positioned to cross the suction hole 2h of the suction casing 2 with its both ends hinge-coupled. One end of the brush 4 is connected to

25 a driving motor (not shown) by various pulleys (not shown), so that the brush 4 can be rotatably driven.

Accordingly, when the suction motor is operated, the suction force is generated by the vacuum pressure, and thus the substances and the ambient air are sucked from the bottom through the suction hole 2h of the suction head. Here, when the driving motor is operated, the brush 4 is rotated to pressurize and agitate 5 the bottom. The substances hidden deep in the carpet are floated or the substances adhered to the bottom are easily separated from the bottom, and sucked through the suction hole 2h with the sucked air.

The sucked air including the sucked substances flows through the suction tube 1 and the suction path and is separated from the substances. When the 10 sucked air passes through the filter assembly, the fine alien substances of the sucked air such as dusts are filtered off. Then, the air is discharged through the exhaust unit.

However, thin and long substances such as hairs or furs of a pet dog exist on the bottom. In the conventional vacuum cleaner installing the brush on the 15 agitator to improve cleaning efficiency, the thin and long substances are sucked through the suction hole by the vacuum pressure of the suction motor, transferred along the suction path, and wound around the rotating brush, instead of being separated from the sucked air with the other substances in the main body. The thin and long substances wound around the brush are not good for sanitation and 20 appearance. Also, the thin and long substances reduce cleaning efficiency by deteriorating the function of the brush. Furthermore, it is difficult for the user to remove the thin and long substances wound around the brush.

DISCLOSURE OF THE INVENTION

25 The present invention is achieved to solve the above problems. An object of the present invention is to provide a vacuum cleaner which can make a brush

clean and maintain performance of the brush, by sucking thin and long substances from the bottom before being wound around the brush, sending the substances to a suction path, and separating the substances with the other substances in a main body, when the brush for pressurizing and agitating the bottom by a rotary force is 5 rotatably installed on a suction head for sucking the air including substances.

In order to achieve the above-described object of the invention, there is provided a vacuum cleaner, including: a suction head being installed at a front end of a suction path for sucking substances by a vacuum pressure generated by a suction motor, and having a suction hole for sucking the substances on its bottom; 10 a brush installed on the suction hole of the suction head, and rotated to contact the bottom; and a hair tunnel formed on the suction head not to interfere with the brush, for preferentially sucking thin and long substances from the bottom.

The hair tunnel is linked to the front end of the suction path through a path isolated from the path for linking the suction hole to the front end of the suction path 15 in the suction head. The inlet unit of the hair tunnel is installed to surround the suction hole, or installed at the front and/or rear portion of the suction hole in the general suction head progress direction.

A sweeper is installed at the inlet unit of the hair tunnel, for preferentially sucking the thin and long substances from the bottom to the hair tunnel. The 20 sweeper includes a first sweeper partially downwardly protruded from the bottom surface of the end of the inlet unit of the hair tunnel far from the suction hole, and a second sweeper downwardly protruded from the bottom surface of the end of the inlet unit of the hair tunnel close to the suction hole.

In detail, the first and second sweepers are formed in a group bristle shape 25 or comb-tooth shape with a predetermined width. The interval of the comb teeth of the second sweeper is smaller than that of the comb teeth of the first sweeper.

The first and second sweepers can sweep the thin and long substances such as hairs or furs of a pet dog twice.

The comb teeth of the first sweeper are longer than those of the second sweeper to reduce a friction force with the bottom. Some of the comb teeth of the 5 first sweeper include a support member for reducing an operation resistance by the first sweeper and obtaining a flow space of the sucked air.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become better understood with reference to the 10 accompanying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein:

Fig. 1 is a side-sectional view illustrating a suction head of a conventional upright vacuum cleaner;

Fig. 2 is a perspective view illustrating an upright vacuum cleaner in 15 accordance with the present invention;

Figs. 3 and 4 are a side-sectional view and a rear view illustrating a suction head of the upright vacuum cleaner of Fig. 2;

Fig. 5 is a rear view illustrating another example of the suction head that can be applied to the upright vacuum cleaner of Fig. 2;

20 Figs. 6 and 7 are a perspective view and a side-sectional view illustrating first and second sweepers applied to hair tunnels of the upright vacuum cleaner of Fig. 2; and

Figs. 8A and 8B are front views illustrating examples of the first and second sweepers of Fig. 6.

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BEST MODE FOR CARRYING OUT THE INVENTION

The preferred embodiments of the present invention achieving the above object will now be described in detail with reference to the accompanying drawings.

The preferred embodiments of the present invention will now be explained by exemplifying an upright vacuum cleaner. However, the scope of the present invention should not be limited to these preferred embodiments but to the claims as hereinafter recited. Especially, the present invention can be applied to different types of vacuum cleaners including the structure of the claims, such as floor type and hand type vacuum cleaners.

Referring to Fig. 2, the upright vacuum cleaner includes a main body 50 for generating a suction force and separating substances from sucked air, and a suction head 60 linked to the main body 50, for sucking the sucked air. The suction head 60 is installed to individually suck thin and long substances such as hairs or furs of a pet dog from the sucked air.

The main body 50 includes a main body casing 52 having a suction path inside, a filter assembly 54 installed on the suction path of the main body casing 52, for filtering off substances of the sucked air such as dusts, and a suction motor 56 installed on the suction path of the main body casing 52 at the rear end of the filter assembly 54, for generating a suction force.

A suction tube 1 is installed at the lower region of the main body casing 52 to be connected to the suction path and linked to the suction head 60. An exhaust unit 58 having a plurality of slit holes is formed at the rear upper region of the main body casing 52, for discharging the air passing through the filter assembly 54.

A handle 59 is upwardly extended from the higher region than the exhaust unit 58 in the main body casing 52, and a control unit (not shown) for controlling the operation of the suction motor 56 is formed at one side of the main body casing 52.

The suction motor 56 is formed in a cylindrical shape. When power is

applied to the suction motor 56, the fan is rotated to generate the suction force by the air pressure difference. The filter assembly 54 is detachably installed in the suction area, and the exhaust unit 58 of the main body casing 52 is linked to the discharge area.

5 Here, the filter assembly 54 includes various filter members for filtering off the substances of the air sucked to the suction motor 56, such as dusts, hairs and furs of a pet dog, or a dust collecting vessel for collecting the substances of the air in a cyclone method.

On the other hand, as illustrated in Figs. 3 and 4, in the suction head 60, a
10 suction casing 62 is hinge-coupled to the lower portion of the main body casing 52, a brush 64 is rotatably installed on a suction hole 62h formed on the bottom surface of the suction casing 62, and a pair of hair tunnels 66 and 68 are formed on the suction hole 62h at both sides of the progress direction of the suction head 60. The hair tunnels 66 and 68 are linked to the suction tube I of the main body casing
15 52, for sucking the thin and long substances such as hairs or furs of a pet dog individually from the suction hole 62h.

The suction casing 62 has its top end linked to the suction tube I of the main body casing 52, and is hinge-coupled to be freely moved. The rectangular suction hole 62h is formed long in the width direction on the bottom surface of the suction casing 62. A suction path (not shown) is formed in the suction hole 62h, for
20 guiding the sucked air to the suction tube I of the main body casing 52.

The brush 64 is positioned to cross the suction hole 62h with its both ends hinge-coupled. One end of the brush 64 is connected to a driving motor (not shown) by various pulleys (not shown) and rotatably driven.

25 Here, the brush 64 is formed in a cylindrical shape. Spiral bristles are protruded from the surface of the brush 64. When the suction hole 62h is adhered

to the bottom, the brush 64 pressurizes the bottom, facilitates suction of the substances hidden in the bottom such as dusts, and generates a suction force.

Especially, the hair tunnels 66 and 68 are isolated from the path for linking the suction hole 62h to the front end of the suction tube I, and linked to the front 5 end of the suction tube I of the main body casing 52 in the suction casing 62, for generating the suction force inside. The inlet units 66h and 68h of the hair tunnels 66 and 68 are much smaller than the suction hole 62h, for individually sucking the thin and long substances.

In detail, as shown in Fig. 4, when seen in the progress direction of the 10 suction holes 62h, the hair tunnels 66 and 68 can be two hair tunnels 66 and 68 having their inlet units 66h and 68h formed at the front and rear portions of the suction hole 62h. Preferably, the inlet units 66h and 68h are formed in a slot hole shape long in the width direction at predetermined intervals from the suction hole 62h.

15 It is also possible to form only one of the front hair tunnel 66 having its inlet unit 66h formed at the front portion of the suction hole 62h and the rear hair tunnel 68 having its inlet unit 68h formed at the rear portion of the suction hole 62h.

Accordingly, when the suction head 60 moves forward to clean the bottom, the thin and long substances are sucked through the front hair tunnel 66, and the 20 other large substances are sucked through the suction hole 62h. Conversely, when the suction head 60 moves backward to clean the bottom, the thin and long substances are sucked through the rear hair tunnel 68, and the other large substances are sucked through the suction hole 62h.

Although the substances are individually sucked through the hair tunnels 66 25 and 68 and the suction hole 62h, the substances are collected at the front end of the suction tube I of the main body casing 52, transferred through the suction tube I

and the suction path of the main body casing 52, and filtered off.

On the other hand, as shown in Fig. 5, the inlet unit 166h of the hair tunnel 166 can be formed to surround the suction hole 62h. Preferably, the inlet unit 166h is formed in a polygonal ring shape with a predetermined interval from the 5 circumference of the suction hole 62h.

Therefore, when the suction head 60 moves in any one of the forward and backward and side directions to clean the bottom, the thin and long substances are sucked through the hair tunnel 166, and the other large substances are sucked through the suction hole 62h. Such substances are transferred through the 10 suction tube I and the suction path, and filtered off.

As described above, since the thin and long substances such as hairs or furs of a pet dog are sucked through the hair tunnels 66, 68 and 166 and the other substances are sucked through the suction hole 62h, the thin and long substances little exist in the air. Even if the thin and long substances pass through the brush 15 64, they are not wound around the brush 64. As a result, the user does not have to clean the brush 64. The appearance of the vacuum cleaner can also be improved. Because the substances are sucked through the hair tunnels 66, 68 and 166 and the suction hole 62h at the same time, the cleaning area can be widened and suction efficiency can be improved.

20 On the other hand, referring to Fig. 6, the suction head 60 of the vacuum cleaner includes first and second sweepers 66a, 66b, 68a and 68b at the front and rear ends of each hair tunnel 66 and 68. The first and second sweepers 66a, 66b, 68a and 68b of the hair tunnels 66 and 68 are more protruded than the bottom surface of the suction casing 62 on which the inlet units 66h and 68h of the hair 25 tunnels 66 and 68 have been formed. When the suction casing 62 moves closely to the bottom such as a carpet C, the first and second sweepers 66a, 66b, 68a and

68b are inserted into the bottom and transferred. Therefore, the thin and long substances hidden in the bottom are hooked on the first and second sweepers 66a, 66b, 68a and 68b. The thin and long substances hooked on the first and second sweepers 66a, 66b, 68a and 68b are efficiently sucked through the adjacent inlet 5 units 66h and 68h of the hair tunnels 66 and 68 by the suction force generated by the hair tunnels 66 and 68.

The first and second sweepers 66a, 66b, 68a and 68b are downwardly protruded from the progress direction and the opposite direction of the hair tunnels 66 and 68, respectively. In detail, the first and second sweepers 66a and 66b are 10 formed at the front and rear ends of the front hair tunnel 66, and the first and second sweepers 68a and 68b are formed at the rear and front ends of the rear hair tunnel 68.

In addition, the first and second sweepers 66a, 66b, 68a and 68b can be irregularly downwardly protruded from the front and rear ends of the hair tunnels 66 15 and 68, or formed in a group bristle shape or a comb shape having teeth at regular intervals. The first and second sweepers 66a, 66b, 68a and 68b will now be explained in more detail with reference to Figs. 8A and 8B. The interval a1 between the comb teeth of the first sweepers 66a and 68a is relatively larger than the interval a2 between the comb teeth of the second sweepers 66b and 68b.

20 Accordingly, when the suction head 60 moves forward or backward to clean the bottom, the thin and long substances hidden in the bottom are firstly hooked on the relatively sparse comb teeth of the first sweepers 66a and 68a, and the other thin and long substances are secondly hooked on the relatively dense comb teeth of the second sweepers 66b and 68b. Because the thin and long substances are 25 filtered off by the comb teeth of the first and second sweepers 66a, 66b, 68a and 68b twice and sent to the adjacent hair tunnels 66 and 68, the thin and long

substances are not wound around the brush 64 through the suction hole 62h.

In the case that the comb teeth of the first and second sweepers 66a, 66b, 68a and 68b are more densely formed, the friction force to the bottom increases. Accordingly, a large force is required to move the suction head 60, and the air is

5 not efficiently sucked between the comb teeth of the first and second sweepers 66a, 66b, 68a and 68b, which reduces cleaning performance. In order to solve the foregoing problems, the length b1 of the comb teeth of the first sweepers 66a and 68a is more lengthened than the length b2 of the comb teeth of the second sweepers 66b and 68b, and space obtaining support members 66c and 68c are

10 downwardly protruded with a length shorter than the length of the first sweepers 66a and 68a between the first sweepers 66a and 68a and the hair tunnels 66 and 68. The space obtaining support members 66c and 68c can be formed on some of the comb teeth of the first sweepers 66a and 68a.

Because the ends of the comb teeth of the first sweepers 66a and 68a are

15 inserted into the bottom such as the carpet C and the space obtaining support members 66c and 68c are supported on the bottom, the friction force decreases between the first sweepers 66a and 68a and the bottom. Thus, the suction head 60 can be easily transferred, and the suction flow can be increased by forming a suction space S for sucking the sucked air between the first sweepers 66a and 68a

20 and the bottom, thereby improving cleaning performance.

The operation of the upright vacuum cleaner in accordance with the present invention will now be described.

When the suction head 60 moves forward to clean the bottom, if the suction hole 62h of the suction casing 62 is transferred closely to the bottom such as the carpet C, the first and second sweepers 66a, 66b, 68a and 68b are inserted into

25 the bottom and transferred to hook the thin and long substances such as hairs and

furs of a pet dog. The brush 64 is also transferred to pressurize the bottom.

Here, when the suction motor 56 is operated, the suction force is generated in the suction hole 62h and the hair tunnels 66 and 68. Various substances hooked on the first sweeper 66a are sucked through the front hair tunnel 66, and 5 the other furs are hooked on the second sweeper 66b having denser comb teeth than the first sweeper 66a and sucked through the front hair tunnel 66 again. Some furs are guided by the first and second sweepers 68a and 68b and sucked through the rear hair tunnel 68.

In addition, the brush 64 is rotated to pressurize the bottom, and thus the 10 substances hidden in the bottom such as dusts are efficiently sucked through the suction hole 62h.

Even if the ends of the comb teeth of the first sweepers 66a and 68a are inserted into the carpet C, since the space obtaining support members 66c and 68c are supported on the bottom, the sucked air is sucked to the suction space S and 15 sucked through the front and rear hair tunnels 66 and 68 and the suction hole 62h. That is, the suction area is relatively widened to improve cleaning performance. Because most of the thin and long substances are sucked through the front hair tunnel 66, the other substances are sucked through the suction hole 62h. It is thus possible to prevent the thin and long substances from being wound around 20 the brush 64.

As described above, various substances sucked through the front and rear hair tunnels 66 and 68 and the suction hole 62h are transferred through the suction tube 1 and the suction path of the main body casing 52, filtered off through the dust collecting vessel and/or the filter assembly 54, and externally discharged through 25 the exhaust unit 58 via the suction motor 56.

On the other hand, when the suction head 60 moves backward to clean the

bottom by operating the suction motor 56, various furs are guided by the first and second sweepers 68a and 68b in the rear hair tunnel 68 and filtered off in the same manner.